CLAIMS:

1. A Method for producing terminal swine parent animals having improved germplasm, the method comprising:

    a. providing at least one genetic nucleus herd and/or a target herd for which improvement is desired

    b. selecting a trait or traits, for which improvement is desired;

    c. providing semen aliquots from an elite sire selected from the genetic nucleus (GN) herd wherein the elite sire has a desired germplasm that is determinative for improving one or more selected trait(s) in the target herd;

    d. using the semen aliquots to impregnate a correlative number of breeding females in a target herd; wherein the semen from the elite sire is used to breed substantially all of the females in the target herd;

    e. producing half-sib offspring having improved germplasm when compared with the breeding females in the target herd; and

    f. providing at least one of the half-sib offspring as the terminal swine parent in a SP (swine production herd), or as a replacement animal for the GN herd, or as a replacement animal for the target herd, whereby the genetics are improved in the target herd and/or SP.

2. The method of claim 1 wherein the herd(s) for which improvement is desired is selected from one or more of the group consisting of: a genetic nucleus herd, a production nucleus herd, crossbred boar multiplier herd, an external genetic nucleus herd, and a crossbred gilt multiplier herd.

3. The method of claim 2 wherein the target herd is a production nucleus herd.

4. The method of claim 2 wherein the target herd is a crossbred boar multiplier herd.

5. The method of claim 2 wherein the target herd is a crossbred gilt multiplier herd.

6. The method of claim 2 wherein the target herd is an external genetic nucleus herd.

7. The method of claim 1 wherein the selected elite sire is selected for as having germplasm favorable for providing offspring having at least one of the following: one or more desired qualitative or economic trait locus/loci; one or more desired quantitative trait locus/loci a desired estimated breeding value (EBV); a desired genotype or phenotype; one or more desired health trait(s), one or more desired meat quality trait(s), one or more desired reproduction trait(s); or one or more desired efficient growth trait(s).

8.   The method of claim 1 comprising identifying female half-sib offspring having preferred germplasm and retaining these female half-sib offspring as breeding females in the target herd.

9.   The method of claim 1 comprising:

    a.   providing semen aliquots from an elite sire selected from a GN (genetic nucleus herd), the elite sire having a germplasm determinate for a SETBV (specific economic trait breeding value);

    b.   using the semen aliquots to impregnate a correlative number of breeding females in a target herd, wherein the breeding females have a lower SETBV than the elite sire and wherein the semen aliquots are used according to a breeding plan designed to be suitable to produce an average of at least 160 half-sib offspring per week, from the elite sire, for a period of from one week to about one year

    c.   producing half-sib offspring having a higher SETBV than the breeding females in the target herd; and

    d.   providing at least one of the half-sib offspring for use as a terminal swine parent in a SP (swine production herd) or as a replacement animal in the target herd; whereby the average SETBV is increased in the target herd and/or the SP herd.

10.   The method of any of claims 1–8 wherein semen from the elite sire is used in a breeding plan suitable for producing an average of at least 160 half-sib offspring per week from the elite sire, for a plurality of successive weeks.

11.   The method of claim 1 wherein semen from the elite sire is used in a breeding plan is suitable for producing an average of at least 320 half-sib offspring per week from the elite sire, for a plurality of successive weeks.

12.   The method of claim 1 wherein semen from the elite sire is used in a breeding plan is suitable for producing an average of at least 640 half-sib offspring per week from the elite sire, for a plurality of successive weeks.

13.   The method of claim 1 wherein semen from the elite sire is used in a breeding plan is suitable for producing an average of at least 1280 half-sib offspring per week from the elite sire, for a plurality of successive weeks.

14.   The method of any of claims 1–8 wherein the germplasm is improved in the target herd independently of any improvement in the GN herd.

15.   The method of any of claims 1–8 wherein the germplasm is improved in the SP herd independently of improvement in the GN herd.

16.   The method of any of claims 1–8 wherein the germplasm is improved in the target herd and/or SP concurrently with improvement in the GN herd.

17.   The method of any of claims 1–8 wherein the germplasm is improved more rapidly in the target herd and/or SP herd than in the GN herd.

18.   The method of claim 1 wherein the breeding females are impregnated using deep intrauterine insemination (DIUI).

19.   The method of 18 wherein the DIUI is conducted using 1.5 billion or fewer spermatozoa.

20.   The method of claim 18 wherein the DIUI is conducted using between 75 million and 1.5 billion spermatozoa.

21.   The method of claim 18 wherein the DIUI is conducted using between 30 million and 1.5 billion spermatozoa.

22.   The method of claim 18 wherein the DIUI is conducted using between 10 million and 1.5 billion spermatozoa.

23.   The method of claim 18 wherein the DIUI is conducted by delivering the spermatozoa to the anterior portion of the uterine horn.

24.   The method of claim 1 wherein the breeding females are inseminated using 75 million, or fewer spermatozoa.

25.   The method of claim 1 wherein the breeding females are impregnated using 10 to 75 million spermatozoa.

26.   The method of claim 24 wherein the insemination is conducted by delivering the spermatozoa at or near the utero-tubal junction.

27.   The method of claim 1 wherein a single boar is used to impregnate all or substantially all of the breeding females in the target herd.

28.   The method of claim 1 wherein the GN herd is Rendement Napole-negative and halothane-negative.

29.   The method of claim 1 wherein the GN herd is maintained under selection pressure at a population size effective for maximizing rate of genetic improvement according to a breeding plan while simultaneously maintaining an acceptable rate of inbreeding.

30.   The method of claim 1 comprising selecting, for use as terminal sires, male half-sib offspring having the desired germplasm.

31.   The method of claim 1 comprising making rapid genetic improvement in commercially valuable traits in the target herd and in the terminal sires for the SP herd through use of a breeding plan designed to provide an improvement selected from the group consisting of (1) increasing the frequency of one or more desirable alleles for commercially valuable traits that contribute to higher estimated breeding values, (2) optimizing the frequencies of certain alleles or genotypes known to be associated with quantitative trait loci (QTL) for commercially valuable traits; and (3) optimizing the frequencies of certain alleles or

genotypes for several qualitative economic trait loci (ETL) linked to commercially valuable traits, and combinations of any two or three thereof.

32.   The method of claim 1 wherein the selected trait(s) include one or more of the following: efficient growth traits; meat quality traits; reproduction traits; and health traits.

33.   The method of claim 1 comprising selecting female half-sib offspring to be replacement dams in the target herd and further comprising repeating steps a. through d. to achieve a desired level and/or frequency of the selected trait or traits in the target herd.

34.   The method of claim 1 wherein an improvement of the selected trait or traits is/are achieved in the target herd without introducing any improvement of these trait(s) into the GN herd.

35.   The method of claim 1 wherein the selected trait(s) are improved to a more favorable degree in the target herd than in the GN herd.

36.   The method of claim 1 wherein the frequency of one or more alleles is fixed in the target herd without being fixed in the GN herd.

37.   The method of claim 1 wherein, by using a target herd separate and distinct from the GN herd, the desired trait(s) are improved separately in the target herd as compared with the GN herd through use of one or more of the following procedures: (1) using a GN herd containing the minimum number of females necessary to maintain high annual genetic gain and low annual change in inbreeding level or (2) using a target herd containing the minimum number of females to meet plan-specified market demands for target herd offspring.

38.   The method of claim 1 wherein the trait(s) selected for improvement comprises one or more traits selected from the group consisting of: efficient growth traits; meat quality traits; reproduction traits; and health traits.

39.   The method of claim 1 wherein at least one selected trait is an efficient growth trait selected from the group consisting of: average daily gain, average daily feed intake, feed efficiency, back fat thickness, loin muscle area, and lean percentage.

40.   The method of claim 1 wherein at least one selected trait is a meat quality trait selected from the group consisting of: muscle pH, purge loss, muscle color, firmness and marbling scores, intramuscular fat percentage, and tenderness.

41.   The method of claim 1 wherein at least one selected trait is a reproductive trait selected from the group consisting of: number of piglets born per litter, piglet birth weight, piglet survival rate, pigs weaned per litter, litter weaning weight, age at puberty, farrowing rate, days to estrus, and semen quality.

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42.   The method of claim 1 wherein at least one selected trait is a health trait selected from the group consisting of: the absence of undesirable physical abnormalities or defects, improvement of feet and leg soundness, resistance to specific diseases or disease organisms, or general resistance to pathogens.

43.   A target herd produced using a method according to either claim 1 or claim 33.

44.   The herd of claim 43 wherein semen from the elite sire is used in a breeding plan suitable for producing an average of at least 160 half-sib offspring per week from the elite sire, for a plurality of successive weeks.

45.   The herd of claim 43 wherein semen from the elite sire is used in a breeding plan is suitable for producing an average of at least 320 half-sib offspring per week from the elite sire, for a plurality of successive weeks.

46.   The herd of claim 43 wherein semen from the elite sire is used in a breeding plan is suitable for producing an average of at least 640 half-sib offspring per week from the elite sire, for a plurality of successive weeks.

47.   The herd of claim 43 wherein semen from the elite sire is used in a breeding plan is suitable for producing an average of at least 1280 half-sib offspring per week from the elite sire, for a plurality of successive weeks.

48.   The target herd of claim 43 wherein the improved trait(s) comprise at least one trait selected from the group consisting of: efficient growth traits; meat quality traits; reproduction traits; and health traits.

49.   The herd of claim 43 wherein at least one trait is an efficient growth trait selected from the group consisting of: average daily gain, average daily feed intake, feed efficiency, back fat thickness, loin muscle area, and lean percentage.

50.   The herd of claim 43 wherein at least one trait is a meat quality trait selected from the group consisting of: muscle pH, purge loss, muscle color, firmness and marbling scores, intramuscular fat percentage, and tenderness.

51.   The herd of claim 43 wherein at least one trait is a reproductive trait selected from the group consisting of: number of piglets born per litter, piglet birth weight, piglet survival rate, pigs weaned per litter, litter weaning weight, age at puberty, farrowing rate, days to estrus, and semen quality.

52.   The herd of claim 43 wherein at least one trait is a health trait selected from the group consisting of: the absence of undesirable physical abnormalities or defects, improvement of feet and leg soundness, resistance to specific diseases or disease organisms, or general resistance to pathogens.

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53.   A swine production (SP) herd produced using terminal parental swine produced using the method of claim 1.

54.   A genetic nucleus (GN) herd or a target herd produced using swine produced by the method of claim 1 as replacement animals.

55.   The herd of claim 54 that is a genetic nucleus herd.

56.   The herd of claim 54 that is a target herd.

57.   The target herd of claim 56 selected from the group consisting of at least one of the following: a production nucleus herd, a crossbred terminal boar multiplier herd, a daughter nucleus herd, and a crossbred gilt multiplier herd.

58.   The herd of claim 54 wherein semen from the elite sire is used in a breeding plan suitable for producing an average of at least 160 half-sib offspring per week from the elite sire, for a plurality of successive weeks.

59.   The herd of claim 54 wherein semen from the elite sire is used in a breeding plan is suitable for producing an average of at least 320 half-sib offspring per week from the elite sire, for a plurality of successive weeks.

60.   The herd of claim 54 wherein semen from the elite sire is used in a breeding plan is suitable for producing an average of at least 640 half-sib offspring per week from the elite sire, for a plurality of successive weeks.

61.   The herd of claim 54 wherein semen from the elite sire is used in a breeding plan is suitable for producing an average of at least 1280 half-sib offspring per week from the elite sire, for a plurality of successive weeks

62.   A Method for making rapid change in the frequency of an allele in a target herd while concomitantly maintaining optimal long-term selection pressure for the allele in a genetic nucleus (GN) herd, the method comprising:

   a.   providing at least one genetic nucleus herd at least one target herd;

   b.   selecting an allele for which increased frequency in the target herd is desired;

   c.   providing semen aliquots from an elite sire selected from a genetic nucleus (GN) herd wherein the elite sire has a desired germplasm that is determinative for increasing the frequency of the desired allele;

   d.   using the semen aliquots to impregnate a correlative number of breeding females in a target herd; wherein the semen from the elite sire is used to breed substantially all of the females in the target herd;

   e.   producing half-sib offspring having an increased frequency of the selected allele when compared with the breeding females in the target herd; and

f.   repeating steps c. through e. as necessary to achieve the desired frequency for the selected allele;

wherein the inbreeding rate of the GN herd is maintained at an acceptable level.

63.   The method of claim 62 wherein the selected elite sire is homozygous for the selected allele.

64.   The method of claim 62 carried out so as to fix the selected allele in target herd.

65.   The method of claim 62 where there is substantially no reduction in genetic variance in the GN herd, at the selected allele.

66.   A method for producing swine offspring, the method comprising:

a.   providing at least one genetic nucleus herd and/or a target herd for which improvement is desired

b.   selecting a trait or traits, for which improvement is desired;

c.   providing semen aliquots from an elite sire selected from the genetic nucleus (GN) herd wherein the elite sire has a desired germplasm that is determinative for improving one or more selected trait(s) in the target herd;

d.   using the semen aliquots to impregnate a correlative number of breeding females in a target herd; wherein the semen from the elite sire is used to breed substantially all of the females in the target herd;

e.   transferring embryos from the breeding females to surrogate carrier females; and

f.   producing half-sib offspring having improved germplasm when compared with the breeding females in the target herd

67.   The method of claim 66 wherein the embryos are transferred to surrogate carrier females in a specific pathogen free herd.

68.   The method of claim 67 wherein the elite sir and/or the breeding female is not specific pathogen free.

69.   The method of claim 66 wherein the protocol for choosing which elite sire and/or breeding females to mate employs marker-assisted selection and/or marker-assisted allocation.